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ABSTRACT

This review of the relevant literature and data reports on the availability and use of telecommunications technologies in the home was intended to provide a base for a household-based study focusing on those technologies that have a potential for instruction or learning within a home environment. The information provided includes household composition, members' education level, information seeking trends, and learning within the context of the home environment. Usage trends and statistical data are also provided for specific technologies that are utilized in the home: cable television, videotape and videodisc machines, microcomputers, and videotex and database services. A framework for considering incidents of self-directed learning is also presented, as well as suggestions for implementation of the survey. Selected references and two appendices (on data collection problems and cable services that carry advertising) complete the document. (JB)

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TELECOMMUNICATIONS TECHNOLOGIES IN THE HOME:

AN INTRODUCTION AND EVALUATIVE REVIEW OF THE LITERATURE WITH A SPECIAL EMPHASIS ON THE INSTRUCTIONAL USE OF THE TECHNOLOGIES.

VOLUME I

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Foreword

Since the 1970s, the Corporation for Public Broadcasting and the National Center for Education Statistics have undertaken a broadbased research program to document and monitor the uses of television, radio and other telecommunications technologies for education. That program has included studies of uses in elementary and secondary schools (The School Utilization Studies of 1977 and 1983) and institutions of higher education (The Higher Education utilization Study, 1980) as well as studies of the educational services provided by public broadcasting (1976, 1979, and 1983).

To understand fully the impact of telecommunications on learning, it is necessary to know not only the uses of those technologies in schools, colleges and universities, but also their uses for learning in homes and places of work. This report addresses the use of telecommunications technologies in the home for learning.

In moving from institutional-based learning to home-based learning, the researcher is confronted with methodological challenges on at least three levels: defining units for measuring learning; defining sample units that will yield households that have the various technologies; distinguishing educational uses of the technologies from non-educational uses. As one step in designing a household-based study, we asked the Doctors LeRoy to review available data on techologies present in U. S. homes and previous research on self-directed learning.

The LeRoy's have compiled in this one document valuable information, especially on current penetration and use of broadcast television, cable television, videotape recorders, videodisc players, and videotext. They also present a helpful framework for considering incidents of self-directed learning. Their work provides a sound base on which we plan to build a structure for investigating this phenomenon in greater detail.

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PART I: SCOPE OF THE REVIEW

The purpose of this study is to review relevant literature and data reports about the availability and use of telecommunication technologies in the home. The scope of this review is restricted to technologies having a potential for instruction or learning in a household environment. Traditional methods for "distance learning" in the home include instructional television (ITV) courses via a local public television (PTV) station and home study courses that employ related technologies, such as audio or video cassettes. Recently, the potential of using telephone technology to deliver instruction has received new attention. There are also new applications on the horizon that utilize instructional computer programs (either purchased, borrowed or delivered via a telephone modem).

Statistics that indicate the increased availability of consumer technology devices that possibly could be used to deliver instruction are inherently enticing to policymakers in educational technology fields. Of particular interest are such devices as video cassette recorders, personal or home computers and cable TV; yet little is known about the availability of these devices in the home. Most studies that attempt to approach the question of availability are random sorties rather than integrated overviews of what is, in fact, occurring in American homes.

The availability of relevant technologies is one matter. Another related issue involves a decision about what constitutes

home instruction. It seems unduly restrictive to limit a review to the traditional ITV courses offered by colleges. By traditional, we mean instructional materials that are organized into courses that progress through subject matter in an ordered, sequential manner with formalized requirements for student behavior -- such as assigned readings, tests and/or qualifying examinations.

Technologies In The Home

Machines targeted for home use can be categorized in a number of ways. From the point of view of the owner or purchaser, a device can function as a necessity, such as a refrigerator, or a convenience, such as a dishwasher. Generally, social convention defines the function of a machine or technology. A person with a heavy work schedule may feel that a dishwasher is a necessity rather than a convenience, and a mother employed outside the home with teenage children may feel the same way about a microwave oven. In either case, however, society would label these devices convenience appliances. Another group of machines furnish entertainment to a household's residents, such as television, phonograph records and radio. The machines perform no work for the household's members, and their principal function is to entertain and pass the time. The adoption of machines into a society has concerned economists and sociologists for years. Technologies are conventionally perceived as consumer driven or technology or (provider) driven.

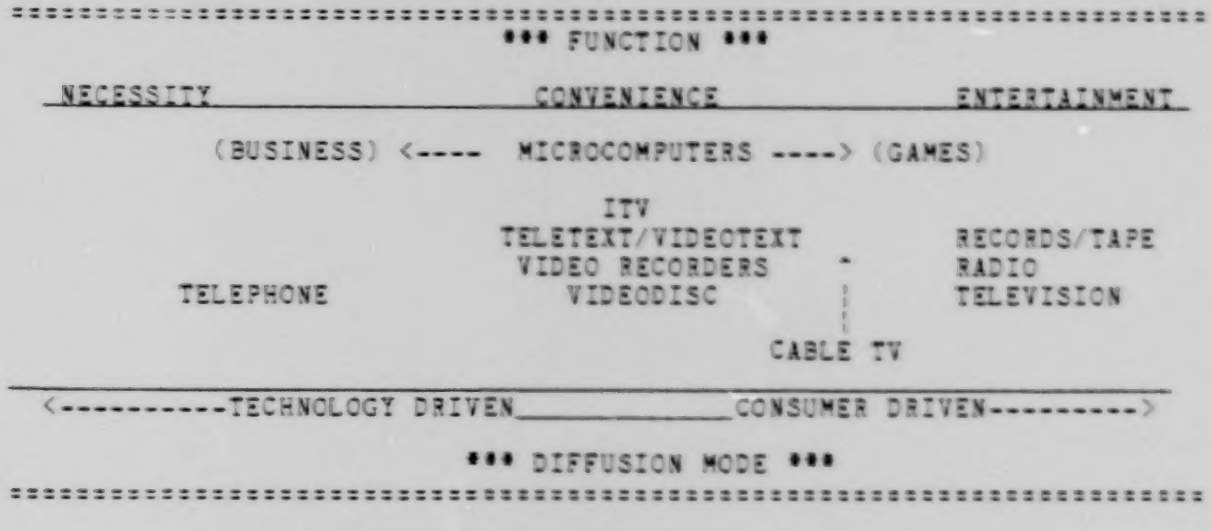
If a technology is a consumer driven device, people want to buy

the product (e.g., television sets). In a consumer driven model of distribution, the consumer literally pulls the innovation through the distribution channels. Conversely, in a technology driven model, the innovation has to be pushed through the channels of distribution. This requires a great deal of effort and expense on the manufacturer's part: A demand must be created via advertising, discounts, etc. A current example is the recent effort to market videodiscs and videotape recorders.

The following figure conceptualizes some of these notions using the various technologies of interest to this review.

FIGURE I-1

THE FUNCTION AND DIFFUSION MODE OF SELECTED TECHNOLOGIES



The Diffusion Of Innovations Tradition

There is a research specialty that focuses upon how societies

and individuals adopt new technologies or practices (Rogers, 1982). The model posits that new innovations diffuse through a society and are rarely adopted instantly or en masse. First, a few daring individuals adopt a practice or purchase a new machine. They experiment with the innovation and eventually either adopt it or discard it.

If adoption takes place among these early experimenters (dubbed innovators), a second and larger group then usually adopts the device or practice. These individuals are dubbed "early adopters." Once an innovation moves into this early adoption phase, it is likely to diffuse rapidly into other strata of society.

The cautionary note that emerges from innovations research is that innovators (the very first people to buy or adopt) often do not resemble those individuals involved in the next stages of adoption. Innovators tend to be younger, affluent and opinion leaders in selected areas. Generally, innovators must rely on printed materials and the mass media to gain information about the new gadget or practice. After they adopt an innovation, they tend to act as interpersonal reference points for the next group, the early adopters. The early adopters, as a group, predict how an innovation will be accepted by the rest of the society. A researcher's primary problem is to predict when a new device or service will move into the early adoption phase.

Most of the innovations of interest in this review demonstrate

the almost classic "trickle down" phenomenon. Innovations, such as computers or videotape recorders, tend to appeal first to the middle or upper-middle classes. As the price drops and mass distribution becomes possible, then the innovation diffuses into other strata of society.

Diffusion rates refer to the speed with which a device spreads throughout a society or country. Consumer driven technologies diffuse far more rapidly than do other technologies. For example, it took 72 years for the telephone (technology driven) to reach 80 percent of all homes. However, radio (consumer driven) took only 19 years to reach 80 percent of American households; black and white television, nine years; and color television, 25 years. Cable television, initially known as community antenna television (CATV), has been in existence for more than 30 years and now reaches about 40 percent of all households.

The typical American household is crammed with consumer durable goods. Literally every home has two or more radios. Almost every home has a vacuum cleaner, toaster, coffee maker, refrigerator and a television set. About 96 percent of American homes have telephone service -- the same percentage as have indoor plumbing. Only 73 percent of American households have clothes washers while 43 percent have dishwashers and garbage disposals. American households have some 170.8 million television sets: 82.3 million are monochrome and 88.5 are color. Americans buy about 17 million television sets a year. About four percent (approximately 3.5 million households)

have videotape recorders and microcomputers.

In summary, technologies differ in their functions in the household and they are purchased for rather limited sets of reasons. Some, such as refrigerators or stoves, may be necessities; others, such as dishwashers or vacuum cleaners, are convenience appliances. Still others, such as television sets or phonograph players, function as entertainment devices. In some instances consumer demand for an appliance is so intense that it literally creates the market. In other instances, manufacturers must create demand by educating consumers, via advertising, about the device's existence and its benefits for the owner.

Devices are adopted or purchased at various rates, which are labeled diffusion rates. However, as illustrated in the next section, diffusion rates are impacted by a society's composition. It is important to know what kind of households and what kind of people will adopt a practice or buy a device.

PART II: THE SHIFTING AMERICAN POPULATION

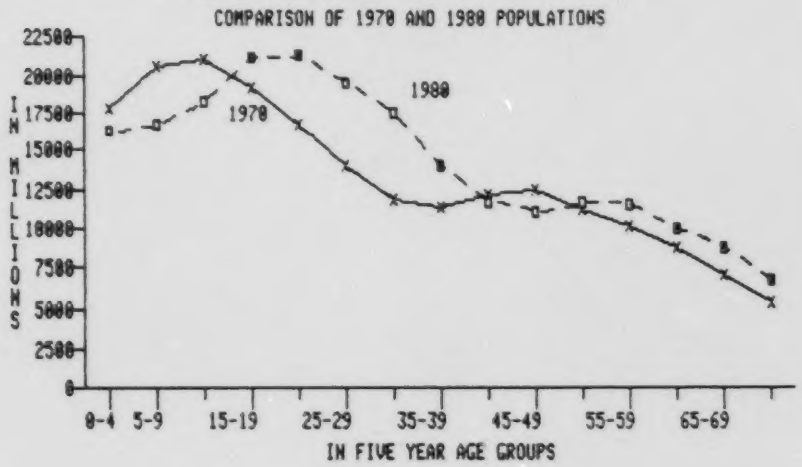
When examining options for the future, policymakers concerned with education, telecommunications and new technologies must consider the changing demographic composition of the American population.

One of the most significant developments in recent American history was the surge in births, labeled the "baby boom", following the Second World War. From 1947 to 1964 Americans of all social strata produced an incredible number of children. While a surge in births is expected after wars, the increase usually fades after a few years as people settle back into their civilian routines. That tapering occurred in most western countries after the war. In America, however, the rising birth rate soared on through the 1950's, before coming to an end around 1964. The result was 42 million children.

The impact of such a large number of children on American society is, by now, well known. The children moved into the school systems, straining resources at all levels for the past 20 years. The last of the baby boom generation is now just entering the work force or completing college. This particular generation constitutes one-third of the entire American population.

In summary form, here are some ramifications of the baby boom on the make up of the American population. The shifts of

FIGURE II-1
COMPARISON OF 1970, 1980 AND 1990
AMERICAN POPULATION -- IN MILLIONS



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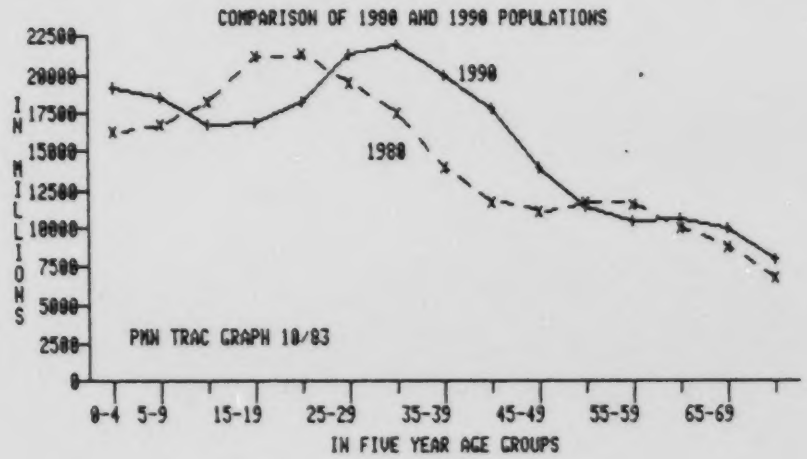

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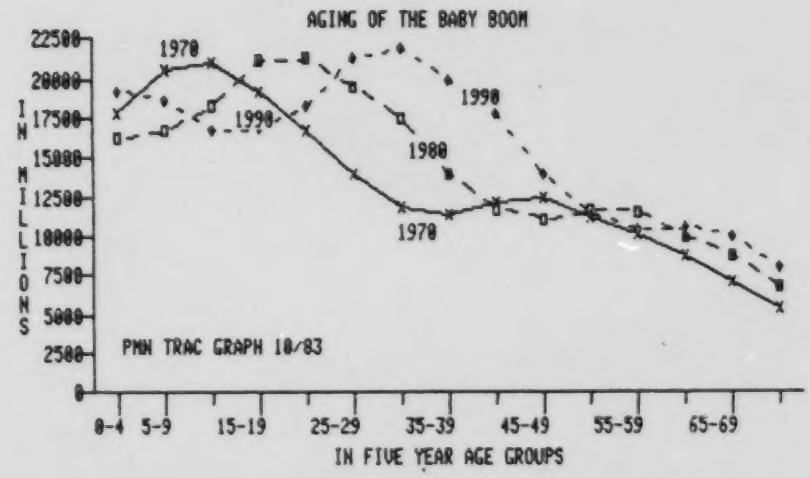


C

Source: U.S. Bureau of the Census, Current Population Reports, Series P-25, No.937, Provisional Projections of the Population of States, by Age and Sex: 1980 to 2000 , U.S. Government Printing Office, D.C., 1983.

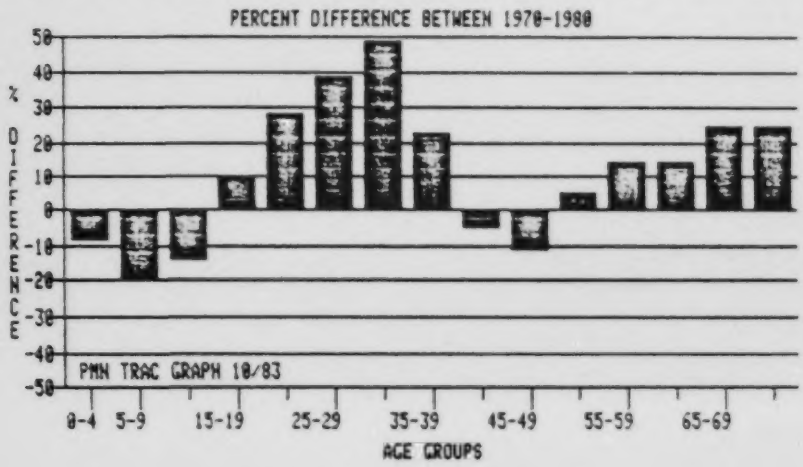
populations are reflected in two sets of graphs inserted into the text. The first (Figures II-1 A through C) depicts the actual numbers of persons in the age cohorts across a 30 year time span, while the second (Figures II-2 A through C) displays the percent increase or decrease in the age groups between 1970-1980 and 1980-1990.

First, a rise in the number of births will occur as the baby boomers pass through their childbearing years. However, social mores have changed, and this generation is having far fewer children per household than did their parents. Nevertheless, since the baby boom generation is so large, even a depressed birth rate will result in a large number of children. (See Figure II-2B.)

Second, the baby boomers are spread across a 17 year span and the members of the leading edge of that wave are moving into middle-age (the 35 to 39 year old bracket), while members of the largest portion of the wave are moving into their mid-twenties. Most of those who have been to college are finishing, and some are already in postgraduate training. However, as demographers point out, when an age cohort has a large number of siblings in a family -- all born within a few years of each other -- the number of college enrollees in a family is often constrained by financial conditions. Hence, there is now a large number of potential nontraditional college students between the ages of 25 to 35.

Third, even though the proportion of persons completing high

FIGURE II-2
PERCENT DIFFERENCE IN POPULATION FOR 1970, 1980 AND 1990



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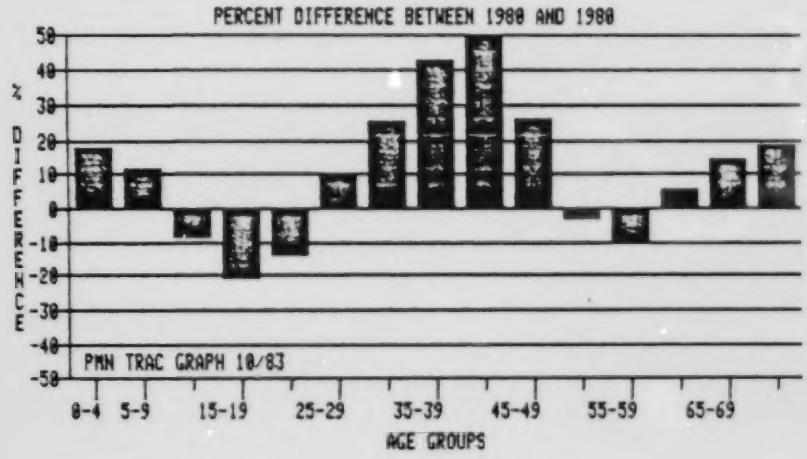

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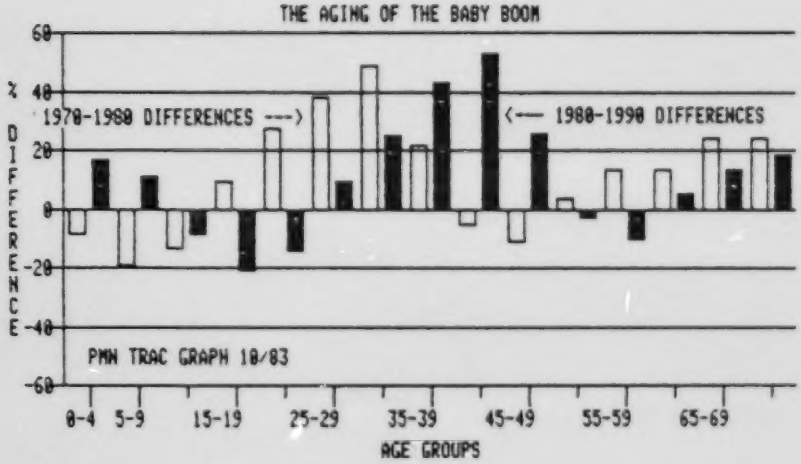

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Source: U.S. Bureau of the Census, Current Population Reports, Series P-25, No.937, Provisional Projections of the Population of States, by Age and Sex: 1980 to 2000 , U.S. Government Printing Office, D.C., 1983.

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school in America is at an all-time high -- as is the percent that will attend college -- the generation that followed the baby boom in the mid-sixties is quite small in comparison. Thus, a gross decline will occur in the number of students seeking vocational training or college degrees in the latter portion of the 1980's.

Fourth, the parents of the baby boomers are moving through their fifties and by the 1990's they will enter retirement. Moving into the powerful peak earning years (45 to 54 years of age) is one of the smallest generations in American history -- those people born during the depression of the 1930's.

In summary, demographically, America will have, as the decade progresses, a large age cohort moving into middle-age and a declining proportion of teen-agers and persons in their twenties. The ranks of the retirees will grow, while the number of senior affluents (50 to 64 year olds) will diminish. Lastly, the younger age groups (0 to 5 years old) will increase slightly, as the baby boom generation moves through childbearing years.

Household Formation

Throughout the 1970's a rapid increase occurred in the number of households (HHS) as the baby boomers left home. A household can be a one-room efficiency apartment or a large mansion; the key fact is that a household is a separate entity that is maintained by one or more persons. A household, from the perspective of

manufacturers, is a market for dishwashing soap, television sets, beds and so on. This is because any expansion of household formation creates new economic demands and potential purchases.

In this section of the report, data about household formation and composition is drawn from various marketing data firms, as summarized by the television rating firm A. C. Nielsen. While the Census Bureau generates much of this data, it is not readily available; hence, marketing firms recast the census data in the form reported here. Most of the data presented here represent television households, which means that about 2 percent of American households are excluded -- namely, those without television sets.

A majority of Americans do not live alone: about 75 percent of all households are estimated to consist of more than one person. However, the trend in recent years has been a growth in the formation of smaller households. Marriage is occurring later, if at all, and a sizable number of people (male and female) are now able to afford single-person households.

TABLE II-1

COMPOSITION OF AMERICAN HOUSEHOLDS

(JANUARY 1982)

HOUSEHOLD SIZE	PERCENT OF HOUSEHOLDS	AVERAGE INCOME (000)	AVERAGE PERSONS PER HOUSEHOLD (OVER 18)	(UNDER 18)	AVERAGE AGE HEAD OF THE HOUSEHOLD
1	22%	$12.2	1.00	--	54
2	32	$22.7	1.93	.07	52
3-4	33	$27.4	2.32	1.15	41
5+	13	$28.8	2.88	2.78	42

Source: A.C. Nielsen, Television Audience 1982 . Base: 81.5M HHS.

About 55 percent of all American households contain one or two persons. In past years, the assumption was that a two person household would consist of adults, not a child and one parent. However, today, 20 percent of the two person houses in America contain an adult and an individual under the age of 18.

TABLE II-2

AMERICAN HOUSEHOLDS
WITH CHILDREN

	PERCENT OF ALL HHS	AVERAGE INCOME
ANY 0-2 YRS	11%	$22.0
ANY 3-5	6	22.2
ANY 6-11	18	24.5
ANY 12-17	19	27.6

Source: See Table II-1

Approximately 40 percent of all households have at least one resident under the age of 18. In all households, 16 percent have

only one child and 24 percent have two or more. Considering only households with children, 60 percent have two or more children. The household having two or more children tends to contain siblings between the ages of six and eleven.

As expected, younger families have less income than older families. The more formal education possessed by the adult residents, the higher the household income tends to be. Therefore, the average income ranges from a high of $41,000 for professionals to a low of $15,000 or below for blue-collar workers.

Finally, it is possible to generalize that the older the child, the higher the family income simply because the parents are older and further along in their careers. This suggests that if newer technologies or delivery systems are targeted at teens or pre-teens, the household is more likely to be able to afford the innovation.

As Table II-3 indicates that during the decade of the 1980's, household formation will slow, as members of the post 1964 generation move into their twenties.

TABLE II-3

PERSONS PER 100 HOUSEHOLDS

	1980	1985	1990
65+	30	30	29
50-64	42	37	34
35-49	47	49	52
18-34	81	77	69
HHS (MILLION)	76.3M	86.7M	94.7M

To read the table: 30% of all HHS will have a 65+ resident in 1985 and 29% in 1990.

Source: A.C. Nielsen, Television Audience 1982 .

Households are the crucial variable in considering the diffusion of some of the newer technologies. Note that the households will increase 12 percent between 1980 and 1985 and 9 percent between 1985 and 1990. The proportion of every age group except the 35 to 49 age cohort will decrease in American households. New delivery systems such as cable TV, videotape machines, or microcomputers usually diffuse (or gain acceptance) initially in the affluent sectors of society. Granted the necessary income and the affordability of the innovation, new technologies tend to spread first among the middle-aged and younger age groups. So it appears that the age cohort more likely to adopt these newer technologies is also the largest growing household category in this decade.

Education And Age

Like the Gordian knot, age and level of education seem

inexorably intertwined. It should be clear that one does not cause the other. If one was born before 1920, graduation from high school was not particularly common. For persons born in 1960 or 1970, the converse is true. This is because the norms and expectations set by society and its institutions have enormous impact on individuals in the aggregate.

TABLE II-4

YEARS OF SCHOOLING

(PERCENTAGE BY AGE CATEGORY)

	GRADE SCHOOL OR LESS	HIGH SCHOOL 1-3 YRS	HIGH SCHOOL 4 YRS	COLLEGE 1-3 YRS	COLLEGE 4 PLUS	NUMBER IN MILLIONS
25-29 YRS	3.9%	9.8	43.1	21.9	21.3	19,691
30-34 YRS	5.6%	9.6	38.3	21.4	25.3	18,137
35-44 YRS	8.5%	12.5	41.4	16.1	21.5	26,187
45-54 YRS	14.9%	15.5	40.8	12.9	15.8	22,492
55 PLUS	32.0%	16.4	31.2	10.2	10.2	46,391

Source:U.S. Bureau of the Census, Current Population Reports, 1983

In Table II-4, it is not difficult to discern that the younger age cohorts tend to have more years of schooling. Generally, the more education, the more likely it is that the individual will have a higher income and be better able to afford society's services.

Participation In Educational Courses

Carbone (1982) reviewed a number of studies relating to adult learners, the mass media and enrollment patterns. The results suggest a now familiar pattern in terms of demographics. The

younger adults (between 20 and 30 years of age) are more apt to pursue formal credit courses at colleges and universities. If they enroll in courses such as open-circuit ITV courses, they do so generally because they cannot enroll on campus. If circumstances were different, however, ITV enrollees report that they would prefer to enroll on campus.

So, the younger people are more likely to pursue formal credit courses on campus. As an individual ages, interest in courses does not disappear, but interest shifts to self-enrichment courses, and there is less interest in formal credit courses.

In looking at social status, blue-collar workers are more likely to opt for vocationally specific courses that will help them in their jobs or allow them to change jobs, while the white-collar workers and professionals desire courses that will help them in second careers (e.g., real estate courses), self-enrichment or hobbies courses. It is interesting to note that, for the most part, only young adults are interested in courses for credit. Among the blue-collar workers and the middle-aged, there is little interest in courses for credit.

As observed earlier, education and age are strongly correlated. Among older citizens, say among individuals past 50, there is little interest in any kind of classes, except perhaps an occasional effort related to hobbies or retirement benefits.

The findings discussed here could be altered if economic incentives were to be changed dramatically for many workers. If, for example, the Federal Government were to create tax incentives for businesses or individuals so that workers were paid for enrolling in courses, then some changes in enrollment patterns might occur. Hence, the reader should bear in mind that patterns discussed by Carbone relate only to current practices in American society, which could be changed, given different approaches by either educational institutions, governmental entities or by changes in the tax laws.

Information Seeking Patterns

"Information-seeking" is a research term that has been employed in a variety of studies performed in America and in Canada. The findings from such studies have been quite consistent. Chin-Chih and Hernon (1982) studied information needs and information-seeking patterns in six northeastern states. Using a telephone questionnaire, the study demonstrated once again the impact that formal education has on a person's ability to articulate and to seek information in society. Naturally, some interaction occurs between native abilities and the opportunity to complete high school or college.

Chin-Chih and Hernon argued that any information-seeking model that attempts to explain and predict information-seeking behavior has to be grounded in a framework of individual needs and motives.

In the frame of reference introduced earlier, this means that the model is consumer or individual driven, rather than institutionally mandated or technology driven. The researchers operationalized the information-seeking questions by asking the respondents if they "...needed to find the answer to a question, solve a problem, make a decision in two important situations" that might have occurred recently either "at work, home or elsewhere." The respondents were asked to restrict their answers to events that had happened in the past month or so.

Almost one-fifth (17 percent) of the respondents could think of no situations where they needed to know something about a problem or issue. Most respondents could think of only one situation at best. In terms of demographics, the so-called underclass (the poor, elderly, unskilled and so on) had the greatest difficulty in articulating their information needs. The irony of the finding did not escape the researchers:

> The people who require the most in the way of services (welfare, health care, etc.) from society often lack the ability to articulate their needs and often they do not possess the ability to locate such services in a mass society.
>
> Those best able to articulate their information-seeking behaviors were the young and middle-aged, as well as those individuals with some college, technical training or college degrees.

The researchers found that most instances of needing information involved work-related situations (14 percent), consumer issues (13 percent), getting or changing a job (10 percent),

household maintenance (8 percent) and information about schools and education (7 percent).

When asked where they sought answers for their information needs, most respondents listed interpersonal sources as their most important sources, i.e., one would speak to one's family and friends, followed by the appropriate institution (e.g., a Better Business Bureau or school registration office).

It is the perennial finding of people placing a very high emphasis on interpersonal sources for information that puzzles many researchers. Convenience and proximity might be a major factor in looking to one's friends, acquaintances and fellow workers for answers. Traditional information sources such as libraries and government agencies are rarely consulted. No doubt some would argue that perhaps a two-step process is involved here. One consults interpersonal sources first and then, if necessary, one contacts the appropriate institution (e.g., store, school or agency) or professional (e.g., doctor or lawyer).

The key factor to remember in considering new technologies and education is that in the diffusion of information to potential adopters, sources that logically should be consulted -- such as schools, libraries and professionals -- might not be utilized. The vexing problem is how to get accurate and appropriate information into the interpersonal networks that people initially utilize for information.

PART III: LEARNING IN THE HOME ENVIRONMENT

A wide range of learning takes place in the home that falls outside the narrow bounds of formalized instruction -- i.e., "taking a course." The need, here, is to develop a conceptual framework that allows the observer to distinguish between learning that is trivial and of little consequence and learning that results in significant cognitive change.

The principal concern, here, is to cast a conceptual net that captures the full range of learning and instruction in the home and allows one to discern the differences between such acts, not only from a learner's point of view, but also in a way that provides delineations that might impact policymakers at the local and national levels.

Key Concepts

Before setting forth definitions, it may be useful to review a number of puzzles and ambiguities related to learning in the home environment. First, what is learning?

One can learn how to operate a new coffee maker or how to attach a new device to the television set. Is that learning any different than learning how to install insulation in the attic or how to pass American History 101?

If a first criterion for a definition of learning includes purposive or motivated cognitive change, then many activities in the home will fit that definition. For example, what about activities that are defined as hobbies, which require a great deal of structured learning? One may want to learn enough about electricity to rewire the family room but never intend to pursue home electrical repair as a hobby. However, one needs to know a great deal about inks, paper and history to be an effective stamp hobbyist.

Learning is conventionally defined as purposive or motivated cognitive change. Instruction is defined as a sequential or structured learning process that occurs over some arbitrary time frame. Unfortunately, the learner is sometimes an ambiguous source of information about learning or about how a learner pursues an instructional process. A father may buy a home computer with sophisticated game controls. The purpose of the purchase, however, is to assist his dyslexic child by improving the psychomotor skills that are necessary to operate the video game controls on the computer. Moreover, the computer does double duty, since the father also teaches himself enough computer programming to use a program to track his investment portfolio. Here is an instance where the father may learn a great deal about operating a computer, although he never considers himself computer literate. He just wants the machine to track his stocks.

And what about the dyslexic child? He/she may consider the entire experience with the computer as nothing more than playing

games, while the parents note significant improvement in the child's school work, given his/her improved eye and hand coordination.

Here are some of the ambiguities inherent in a discussion of learning in the home.

1. The same machine or device can serve any number of diverse roles in a household.

2. If learning is defined as cognitive change (with or without a purposive motive), then literally thousands of learning acts occur in the home each year. It is difficult to define precisely what is a trivial or random learning event without enacting elaborate external distinctions that assist the observer or theorist but are often irrelevant to the learner.

3. The learner may or may not consider "learning acts" as learning.

4. If one introduces the notion of instruction as an aid in isolating purposive learning from random and trivial learning acts, then one must introduce a time dimension and some concept of a structured or sequential learning event. The concept "instruction" would seem to eliminate the isolated learning event as a conceptual problem. Instruction, as a concept, then subsumes learning in its definition.

5. Note that instruction is not delineated as informal or formal. Instruction may be self-instruction, or it may be a course taken for credit at a nearby college, with the lectures delivered by a dedicated ITV channel on the local cable system. We have required only that instruction include a series of cognitive and/or psychomotor behaviors that results in some change in the learner.

6. Still, instruction is a term that carries with it a great deal of semantic baggage. As we have defined instruction to this point, it is quite similar to Tough's concept of a "Learning Project." Tough's (1971) concept is a bit more neutral than instruction and certainly not as awesome in denotative meaning as the term education.

Learning Projects

Allen Tough's work in Canada (Tough, 1971) dealt with adults, and the study often cited was performed in the early 1970s. It was an informal survey of fewer than 100 persons and was essentially anecdotal in nature.

Carbone (1982) defines a learning project with a paraphrase from Tough:

> "...'a sustained, highly deliberate effort to learn', consisting of a series of related learning 'episodes' carried out within a six-month period and adding up to at least seven hours of activity."

No doubt there are other ways to cast such a definition. For example, how does one operationalize "deliberate", "effort", or "episodes"? Why select the length of "six months" and at "least seven hours of activity"?

Figure III-1 outlines a method for placing some learning activities in a schematic pattern. Certainly not all variations are presented here, but, moving from the top left cell to the bottom right in the figure (i.e., from random learning events to formalized degree seeking), one notes an increasing degree of structure and complexity.

FIGURE III-1

EXAMPLES OF TYPES OF LEARNING

	INFORMAL	
RANDOM LEARNING EVENTS (WATCHING THE NEWS)	SELF-STRUCTURED (LEARNING PROJECTS)	ENRICHMENT CLASS (JEWELRY MAKING)
	FORMAL	
DRILLS AND PREPARATION (MATH REVIEW)	ACCREDITATION CLASS (WORK RELATED OR ENTREPRENEURIAL)	DEGREE SEEKING (COURSES FOR CREDIT)

Theoretically, at least, all of the above examples can be pursued in the home, although convention dictates that the more formal a learning experience, the more likely it is that it will be pursued outside of the home.

Reviewing Some Of The Ambiguities

As noted above, the learner may not be able to explicate what is involved in a learning project. No doubt the dyslexic child would be unable to articulate the function of the computer game, but, rather, the parent would have to be relied upon to report this activity to an investigator.

What about adult respondents? Before a person insulates the attic, he or she would engage in a "little research" and "study" to discern how to insulate attics and perhaps do some shopping to compare brands and prices. Some of this activity is self-instruction because the learning is a motivated, structured

series of acts that occur across time.

How is the insulation example different from one in which someone with a home computer signs up for a math review course? The course is nothing more than computer assisted instruction (CAI) delivered by a computer hooked up to the Control Data Corporation's PLATO system. In this instance, one learns math concepts, one is tested, and one progresses through a set of increasingly complex concepts concerning an area of mathematics.

Let us review how the above two examples differ. In the insulation example, the individual decides to pursue a project and is required to organize and pursue the goal on his own. In the CAI example, the individual is required to have the right computer equipment, the money to afford the course and enough motivation and desire to complete it. Once the course is underway, all of the content, the tests and so on, are organized by some other entity.

Granted, the CAI example embodies a more conventional, if not traditional definition of instruction. But the only real difference in the two examples is who organized the project. Both individuals learned something across a period of time and accomplished a goal. One is graced with a lower fuel bill and the other has a grade or certificate of completion.

Consider again the example of the person who buys a new automatic coffee maker. To operate the appliance properly, the user

must acquire some information (e.g., how to plug it in; where the coffee goes; not to immerse the device completely in water). Most would agree that some learning must occur to operated the appliance properly and that the learning was motivated (getting the appliance to make coffee). For most people, however, the whole effort may require nothing more than a few minutes of reading and a little practice with the appliance.

Still, we are in fact in an ambiguous area with this coffee maker example, since -- for some learners -- it may take a few days to learn all of the things the coffee maker can do. In this instance, the learning acts occurred across time and had some semblance of structure. Admittedly this is a trivial example, but it is important in that it shows that one must differentiate how learning to operate a coffee maker is significantly different from learning to operate a home computer.

The distinction must be developed by consensual validation. No epistemologically valid manner exists in which to distinguish between the learning acts necessary to operate these two machines. Convention determines whether or not a series of learning acts accumulates course credit. The participants may or may not be able to draw the distinctions, so we as outside observers are forced to draw them. This approach could be dangerous, because outside of the traditional instructional areas (number of students enrolled, number of texts sold, number of students taking the final exam, etc.), many of the nontraditional instruction areas are ill-defined; and as

outside observers, we may miss some significant new developments through ignorance. This suggests that one should proceed with an analysis in steps that seek to assure that no significant developments are overlooked.

This means that, in moving from the abstract concepts of learning projects to operational measures, enough structure must be present to permit meaningful quantification, but sufficient latitude must exist to assure that overlooked concepts are captured by the interview instrument. However, before reviewing possible approaches to measuring these concepts, it is advisable to review current changes in American demography and selected technologies in the home.

What emerges from this brief review of demographic variables, information-seeking and educational interests is a profile of the American public that is quite consistent in a number of areas. The underclass individuals are less likely to be able to articulate their needs; they lack the skills to locate information and, often, to find the social agencies that could help them. The less formal education one has, the less likely one is to be interested in new innovations and self improvement. The more formal education one possesses, the higher one's income, and the more likely one is to be able to articulate his or her needs and participate (and no doubt, afford) society's benefits.

PART IV: CONCEPTUALIZING MEDIA TECHNOLOGIES

In the next sections, only those technologies that relate to education and delivery systems are dealt with in any detail. Some newer technologies that are in embryonic stages of development -- such as videotext -- will be discussed only briefly. In one instance -- cable television -- commercial and public television are blended together since there is a high level of synergistic interaction between these variants of television.

At present there are 1,127 television stations, 9,252 radio stations and over 6,000 cable systems in this country. The distinction should be made that these machines or devices are delivery systems -- the hardware. The radio or television set brings the message to the home. But it is the programming -- the news programs, dramas or situation comedies (the software) -- that attracts listeners or viewers. In the last few years, a "revolution" has transpired in delivery systems, not in the software. Most of these changes involve hybrids of existing systems -- such as using telephone modems and television sets (videotext), or coaxial cable configured to handle two-way message traffic (QUBE), or line 21 of the television signal to send teletext services.

Media Created Geography

Political geography tends to be the most predominant view of

the federal government. Districts are drawn for school zones, zip codes, and voting precincts. The physical space of the world is organized around political and service areas. Now the mass media of communication have transformed America into "television markets".

A television signal can extend about 60 to 75 miles, which means that many cities, suburbs and counties are covered by the same television signals. A television market like Chicago or New York includes many different cities, and in some cases, portions of various states. The top ten largest markets, ranked by household size, contain 31 percent of all television households. The top 25 markets contain about 50 percent of the American television households, while the top 50 markets contain about two-thirds of all television households. With approximately 200 television markets, this means that the remaining 150 or so markets contain less than one-third of the total American television households.

Television has created its own unique geography that blurs many governing political entities into "TV markets". Since much of the American population is gathered in large urban centers, television has proven to be an efficient method for reaching many people, because its signals cover such large geographical areas.

Also, since the television market concept is so efficient as a marketing tool, America has been literally transformed for marketing purposes into television markets. For policymakers, that concept must interact with the geography that is determined by political

boundaries; and the lack of congruence here creates many irritating problems. For example, if a school board decides to telecast an ITV schedule, the television signal may cover many different school districts. School districts, not so entitled, may use the ITV courses and not pay for their use. Or, if the school districts decide to cooperate, then the resulting ITV schedule must be subject to protracted discussions among the various school districts concerning when to telecast certain courses.

From its beginning, the cable industry differed from television broadcasting in a crucial way. Cable companies had to be franchised by local political entities. Broadcasters, of course, need only acquire a license from the Federal Communications Commission. If a single cable company sought to serve a market as large as New York, it would, no doubt, require many individual local franchises. Naturally, that is impossible, so cable operators began their existence with a distinct disadvantage: They can rarely wire a whole TV market. That is a serious problem when a cable company's franchise area differs from that of the school district's or county governing board's area.

The next table provides an example of the local reach of various media in the same designated market area (DMA). Compared to commercial television, public television does modestly well; but compared to other media in the same market, such as print, public television does very nicely in terms of reach.

TABLE IV-1

WEEKLY REACH FOR SELECTED MEDIA

	MIAMI	LA	CHICAGO
AVG NETWORK STATION	84%	90%	90%
HIGHEST COMMERCIAL INDEPENDENT	67%	92%	84%
PTV STATION	42%	39%	71%
NUMBER OF DMA CABLE SYSTEMS	25	140	69
PERCENT HHS TAKING CABLE TV	31%	23%	11%
HIGHEST RATED RADIO STATION	20%	16%	20%
LARGEST DAILY NEWSPAPER	33%	22%	23%
TV GUIDE	18%	36%	21%
TIME	5%	7%	8%

Source: A. C. Nielsen, TEST MARKET GUIDE, 1982

Consider the Chicago television market. It has 14 television stations to serve an 18 county area. There are 69 different cable systems reaching 11 percent of the households. And, of course, not all of the cable systems have the same number of channels or carry the same cable programming services. Compared to the television media, print, cable and radio have far less penetration in the market.

How Big Is Big?

From the perspective of the television industry, clearly the other media pale in comparison, if the criterion is the number of homes reached in a week. However, other comparisons are just as

valid and worthwhile. For example, ITV courses telecast by PBS stations are viewed by about a million homes on an average weekday. Four percent of all homes, or 3.5 million households, report owning a computer.

It is all a matter of perspective. In some instances big is better -- such as reaching children in 10.8 million households with SESAME STREET, some of whom learn the alphabet or how to count to ten. In another instance, reaching only 5,000 or 500 individuals with a high school proficiency series is a wise and efficient use of television. From a policymaker's administrative standpoint, both examples could represent efficient and reasonable uses of television. It is good to bear these examples in mind when reading the next sections about television delivery systems.

The "average" household watches its television set(s) about 50 hours per week. And the demographic patterns that were discussed earlier come into play again in the arena of television viewing, but in a different way. Those with less formal education view more television than those with college and professional degrees. Older persons watch more television than younger persons. Women tend to watch more television than men. Teenagers watch the least amount of television.

In the earlier discussion about information seeking, it was noted that the heavy viewers of television are not generally active information seekers. The underclasses watch a great deal of

television, along with the elderly. A person over sixty is more likely to view news and public affairs programs than any other group. So if one wishes to reach the older citizen with a public service message, then television is an ideal medium. If one wished to reach someone in his or her twenties, then television would not be an attractive choice; rather, a medium like the radio station that played this age cohort's favorite music would be a more appropriate choice.

As noted in the next sections of this review, cable television shifts some of these viewing patterns in ways that makes cable rather attractive to policymakers.

PART V: CABLE TELEVISION AND RELATED DELIVERY SYSTEMS

In the cable television microcosm, we see most of the possible models for marketing home entertainment, information, education and ancillary services such as home security or telebanking. It has been suggested that no other mass media industry contains so many examples of faulty logic; i.e., misplaced emphases on viewer (or subscriber) wants and needs.

Dimensions Of The Cable Television Industry

During 1983 approximately 6,000 different cable systems existed in America, with about 30 million subscribers. About 40 percent of the cable systems have less than 12 channels, and approximately 95 percent of all cable systems have some pay or premium channels available.

One of the difficulties in discussing cable television penetration levels (percent of homes taking a service) is that it requires a decision about the baseline(s) for comparison. Currently, two basic methods exist: 1) the first method computes the percentage of households that subscribe to cable out of all households having television available (this method is preferred, as one would expect, by the broadcast industry); or 2) the second method computes the percentage of households that subscribe only among homes where cable is available (this latter measure is preferred by the cable industry).

Figure V-1 summarizes the two approaches to ascertaining cable penetration.

FIGURE V-1

COMPARISON BETWEEN TWO METHODS OF COMPUTING CABLE PENETRATION FIGURES

ALL TELEVISION HOUSEHOLDS MEASURE	
TELEVISION HOUSEHOLDS PASSED BY CABLE	61%
TELEVISION HOUSEHOLDS TAKING CABLE	36%
TELEVISION HOUSEHOLDS TAKING PAY SERVICE	20%
HOUSEHOLDS WITH CABLE TELEVISION AVAILABLE	
HOUSEHOLDS PASSED BY CABLE THAT SUBSCRIBE	57%
TELEVISION HOUSEHOLDS PASSED BY CABLE THAT TAKE A PAY SERVICE	33%
PERCENT OF CABLE HOUSEHOLDS THAT ALSO SUBSCRIBE TO A PAY SERVICE	58%

Based on 83.9 million television households.

Source: CABLEVISION, May 1983

Among all American television households, about 36 percent take cable, and 25 percent have cable available but do not subscribe. The remaining 40 percent of the television homes do not have cable presently available.

More than 60 percent of United States television households are currently passed by cable -- meaning that cable is available and the household could subscribe. Of the homes passed by cable, more than

half subscribe (between 55 and 60 percent, according to most industry sources).

Of the 40 percent of American homes without cable television available, about one half of these homes (or 20 percent of all households) will never be passed by a cable system. Most of these homes are in sparsely populated areas or in areas that are considered uneconomical to wire. This suggests that the cable industry is in the final stages of building cable systems, and that by 1990 most of the building should be completed, with about 80 percent of all homes having access to cable.

Description Of Cable Subscribers

The industry defines two kinds of cable subscribers: One type of subscriber takes cable and no pay tiers -- this is called a basic household; another subscriber type takes a premium service -- it is labeled a pay household. Actually, a third type of household exists also -- a cable rejecter (a household that has cable available and has decided not to subscribe).

As the industry has matured through 30 years of existence, the major development in the last eight years has been the wiring of ajor urban centers, suburbs and, in some instances, the major es themselves. As cable has become available to more and more mes in the urban areas, the subscription rates have increased dramatically. However, numerous marketing studies suggest that

subscription growth has been due to increased availability rather than increased popularity of cable. That is, if one looks at the number of households that wish to subscribe to cable but lack access, or those that subscribe when it is available, the percent that take cable or wish to subscribe has stayed about the same for the last few years. Approximately 55 percent of those without cable say that they would subscribe if it were available, and 58 percent of the homes that are passed by cable presently subscribe.

Cable households have the following characteristics:

1. Profile Of Cable Rejecters. Industry studies have found that households that reject cable tend to have older residents. In one study, the Electronic Media Tracking Service (EMTS) survey, 74 percent of the cable rejecters are satisfied with what they can receive over the air, and 53 percent say that enough programs are available to view without cable. Only 28 percent say that they cannot afford cable television, while 61 percent say that cable is not worth the cost. About nine percent have previously subscribed to cable.

2. Profile Of Basic Subscribers. The problem in assessing the distinctions between basic and pay subscribers is that many basic homes are in sparsely settled areas, and these homes need cable to receive even network services. The result is that many basic homes contain people who need cable, but who are not pay subscribers. In some instances, it is suspected that many of these basic homes would

be cable rejecters if they lived in a larger city with sufficient broadcast television available.

So, if one compares basic and pay cable homes on various demographic variables, the basic cable household tends to have older residents; or, in some studies, the demographic profile of basic subscribers tends to mirror that of the American population.

3. Profile of Pay Subscribers. About 95 percent of all cable homes have a pay cable service available. However, older systems have perhaps only one service, and that service often is Home Box Office (HBO). Of those with pay cable services available, about 60 percent subscribe. That number has grown from 40 percent two years ago in one study (Benton and Bowles, 1983).

The pay cable home tends to be headed by a younger or middle-aged head of household. Often, there are children and teenagers in the home. The residents are more likely to have been to college, have higher incomes, and live in urban areas. Among those that take pay cable services, about 40 percent have signed up in the last two years and 70 percent in the last five years. More than 30 percent of pay cable homes take two or more premium channels.

The primary reason for taking a pay service is to view movies (78 percent) more cheaply (50 percent) than going to a theater. Less than one half of the pay subscribers cite the lack of

commercials as a reason for subscribing, and only a quarter of the samples cite sports as a reason for signing up. So it is the availability of films more than anything else that is the compelling motive for subscribing.

Public Television Viewing

Television viewing habits or patterns have had more than 30 years in which to establish themselves. It is clear, by now, that the primary use of television is to provide entertainment and, secondarily, news and information. Public television is one of many viewing choices available to American television households. It should be clear that people choose to watch whatever interests them.

Approximately 96 percent of the country can now receive public television through some kind of delivery system. During some rating survey periods, 50 percent of all United States television households tune in to public television once a week and about 30 to 35 percent in prime time. During the whole week, the average public television viewing home watches public television for about three hours. In prime time, the average public television viewing home watches a little more than an hour and a half. The typical public television viewing pattern, especially in prime time, suggests that the public television viewing household watches one or two programs a week.

The public television audience is attracted by a variety of programming, ranging from children's programs such as SESAME STREET to public affairs series like WALL STREET WEEK or WASHINGTON WEEK IN REVIEW, as well as drama, dance and music. Throughout a typical week, the audience for public television builds in bits and pieces, like a mosaic of the population, as viewers watch one or two programs a week that appeal to them. The cume, or reach, of public television is attained by program variety.

Share Of Viewing

Cable television has affected the commercial networks' share of the viewing audience. A 1983 CBS study argues that 56 new commercial independent stations that have come on the air since 1980 have also influenced the declining commercial network viewing shares. In 1977, when only one million pay cable television subscribers existed, the three commercial networks had a combined prime time viewing share of 91 percent. Six years later, in 1983, there were 16.8 million pay subscribers, and the networks' share dropped to 81 percent in prime time. Table V-1 indicates that in January 1983, during the high point of the commercial season when the greatest number of homes view television, the pay cable subscribers displayed a distinct tendency to underview the networks in comparison to non-cable and basic-only viewers.

TABLE V-1

AVERAGE NUMBER OF HOURS AND SHARE OF TELEVISION VIEWING
BY HOUSEHOLD CABLE STATUS
JANUARY 1983

	NON-CABLE	BASIC CABLE	PAY CABLE
WHOLE WEEK AVG HOURS	50	52	61
NETWORK AFFILIATE	81%	75%	59%
INDEPENDENT	18	19	21
PUBLIC TELEVISION	4	4	3
CABLE ORIGINATED	NA	7	9
PAY CABLE	NA	NA	16
TOTAL SHARES	103	105	108
PRIME TIME AVG HOURS	13	13	14
NETWORK AFFILIATE	87%	78%	67%
INDEPENDENT	12	15	13
PUBLIC TELEVISION	5	5	3
CABLE ORIGINATED	NA	8	9
PAY CABLE	NA	NA	24
TOTAL SHARES	104	106	116

Source: A. C. Nielsen, Cable TV Status Report

As the table indicates, the network shares are the lowest in pay cable homes and the highest in non-cable households. In pay homes, almost a quarter of all prime time viewing is devoted to the premium channels. Moreover, as expected, public television's share is the smallest in pay cable homes and about equal in basic and non-cable homes. Note also that pay homes view about the same number of prime time hours, but watch considerably more television during other parts of the day than do other homes.

Viewing And Evaluation Of Cable Programming Services

The number of programming services available to cable subscribers varies by channel capacity on a cable system and by what the local cable operator chooses to purchase for the system. Basic cable programming services generally involve those channels that are available with a basic subscription to a cable system. However, some cable systems require that the subscriber pay extra for a cluster or tier of program channels. Exactly how many cable systems tier their basic programming services is unknown at present.

The major groupings of program services are as follows:

1. Imported independent commercial stations (or superstations) like WTBS from Atlanta or WOR from New York. These stations carry the usual independent's type of program schedules: Movies, sports and off network syndicated programs.

2. Cable oriented programming services such as ESPN (Entertainment And Sports Programming Network), The USA Network, CBN Cable Network, CNN (Cable News Network) and so on. There are approximately 20 of these program services now in existence; about 15 of them are full time or 24 hour per day services. Some services are quite limited in their programming focus (such as the Nashville Network, which plays only country and western music). Others attempt to broaden their program appeal from programming with sports and rock music or entertainment (e.g., USA). Some program services are not stand alone channels, but appear for only a few hours a week (e.g., OVATION, on the USA NETWORK). Appendix B lists cable services, along with a brief description of programming content.

3. Text channels are a cluster of services consisting mostly of text that rotates across the screen, carrying news or financial information. Five or six of these services are currently available. Some of these services carry advertising.

4. Pay or premium channels carry no advertising and require a separate monthly payment from the subscriber. Currently, about 12 national pay services and about 10 regional services exist. Home Box Office (HBO) leads all of the services with about 13 million

subscribers, followed by SHOWTIME with approximately four million subscribers. Two other movie channels, THE MOVIE CHANNEL and CINEMAX, have about 2.5 million subscribers each; all of the remaining services have between 200,000 to 700,000 subscribers.

From the cable operator's point of view, there are really three kinds of services available: Those that are free to the system; those for which the system must pay a fee to carry; and premium services, for which the system charges the subscriber a fee (which is split between the operator and the pay service).

Types Of Cable Programming Services

A few cable programming services are of particular interest to those individuals interested in the relationship between cable television, public broadcasting and education. Among the non-pay cable channels of interest are ACSN (The Learning Channel), C-SPAN, CNN, and NICKELODEON.

The Appalachian Community Service Network (ACSN) began in 1979 as a regional service providing instructional television to the Appalachian region of the country. After a series of reorganizations, the service evolved into a national instructional channel and now provides programming to about 250 cable systems with a potential of about two million viewers. It charges the cable operator five cents per subscriber and cablecasts 10 hours a day, weekdays, and 19 hours a day on weekends.

Recently, ACSN renamed itself the LEARNING CHANNEL, announced

plans to begin its own public affairs series, and expressed a willingness to accept appropriate advertising. The instructional component of the service is comprised of a variety of pre-recorded courses, offered for credit through local colleges and universities. In some instances cable operators split the income from enrollment revenues for college courses with various educational administrations.

CNN (Cable News Network) costs a cable operator 20 cents per subscriber per month (15 cents if the system also carries WTBS). Currently CNN is on 3,500 cable systems and can be viewed in about 20 million homes. The programming is a 24-hour service consisting essentially of news and talk shows. The advertising on CNN is like that seen on commercial broadcasting stations. The audience consists largely of older people, with a number of middle-aged viewers in certain parts of the day.

CNN offers also a companion news service called CNN Headline News. Operators who carry CNN can carry the headline service for an additional three cents per subscriber. The service is currently on approximately 500 cable systems and is available to about four million homes.

C-SPAN (Cable Satellite Public Affairs Network) programs live coverage of the House of Representatives' formal sessions, along with a variety of taped Congressional hearings, political speeches and occasional special events. The service carries no advertising,

although it does have "underwriting" sponsors who place generic or institutional advertisements at the beginning and close of each program or session. The channel cablecasts 24 hours a day and costs the cable operator three cents per subscriber. It is currently carried on about one thousand cable systems and is available to about 13 million homes.

NICKELODEON is owned by Warner-Amex, which also owns THE MOVIE CHANNEL and MTV (Music Television). NICKELODEON is a program service for children. The service purchases most of its programs overseas, but it does carry one or two series purchased or produced in the United States (e.g., LIVEWIRE, for teenagers). The service avoids programs with violence and stresses programs that are pro-social in tone. It cablecasts about 15 hours a day, sharing its transponder with ARTS. It is carried on 2,700 cable systems and is available to about 13 million homes. It costs the cable operator 15 cents per subscriber.

Presently NICKELODEON carries a form of advertising/underwriting with re-edited product commercials appearing at the beginning and end of certain programs. The management has announced that in 1984 the service will carry a more traditional form of product advertising. The guidelines for such advertisement are yet to be determined.

Pay Cable Services

The success of the pay cable services can be traced to two developments: The first is the utilization of satellites to deliver premium programming to cable systems economically and efficiently; the second is the serendipitous discovery that pay movie channels are, for most cable operators, their best marketing tool. Since almost all cable systems require that the subscriber sign up for basic cable to get pay cable, the movie channels helped cable systems enormously increase penetration, especially in larger markets.

As Table V-2 indicates, HBO dominates the premium programming field. It is on about 85 percent of all cable systems and has approximately 75 percent of the total number of pay subscribers. The problem for other services, obviously, is how to compete with this pay cable giant. In most instances, many of the other services merely seek to be the second pay cable service that a subscriber picks up, after HBO.

TABLE V-2

NUMBER OF CABLE SYSTEMS THAT CARRY SELECTED PAY SERVICES AND THEIR ESTIMATED NUMBER OF SUBSCRIBERS

	SYSTEMS	SUBSCRIBERS
BRAVO	90	125,000
CINEMAX	1,800	2,500,000
DISNEY	627	200,000
HBO	5,000	12,500,000
MOVIE CHANNEL	2,600	2,400,000
PLAYBOY	275	500,000
SHOWTIME	2,400	4,100,000

Source: Cablevision July 1983

A number of studies have asked pay cable subscribers whether or not they are pleased with their cable services. Less than one-half of the pay cable subscribers are happy with the limited number of films they receive each month. However, only 52 percent feel that they are receiving fair value for their monthly fee. The crucial question is: Will they continue their pay service? More than 90 percent say they will continue. Up to this point, at least, dissatisfaction appears not strong enough for them to cancel the pay service.

Drawing Conclusions From Cable Television

Little doubt exists that recent developments in the cable television industry have been quite phenomenal. The ability to wire the major markets, especially the affluent suburbs, accounted for some of the accelerated growth. Consider that in 1970 about seven percent of the American TV households subscribed to cable, 22

percent in 1980 and almost 40 percent in the summer of 1983.

Most of that growth has come from homes signing up for pay cable services. It is the type of homes taking pay cable that intrigues observers. The households are affluent, and the household members are more likely to have a college degree and children. Some observers would argue that these are atypical households -- homes of "media addicts" -- but the available evidence does not support that argument. However, pay cable is still a comparatively new or novel service for many homes. Possibly, erosion may set in after the novelty of the service wears off.

Still, for policymakers, cable -- especially in the newer systems with 30 or more channels located around the larger urban centers of America -- is intriguing as a potential delivery system. The subscribers are more likely to have children and teenagers interested in certain kinds of courses. If the lessons of the past are remembered, these modern urban cable systems could serve a variety of needs in the education arena. Clearly, whatever service were to evolve would have to be delivered by satellite to be efficient; and, given the channel(s) available, the service could be scheduled on a 24-hour-a-day basis to serve a variety of target groups.

Videotape Recorders And Disc Machines

The introduction of videotape recorders for the home can be

traced back either to the reel-to-reel helical scan machines in the mid-sixties, or to smaller and easier to use machines with self-contained tape cassettes (videocassette recorder: VCR) developed in 1975. Modified and refined versions of the latter machines now number about 3.5 million units in American homes. The uses of the machines are twofold: They can play back purchased or rented prerecorded tapes or record telecast or cablecast programs.

The emergence of these machines in American homes has been a traditionally illustrative exercise of diffusion. The first machines were expensive and could play only 60 minutes of tape. The early adopters were dubbed "high tech" hobbyists by one author. The principal use of the early machines can be discerned by the titles of tapes sold in the early days of the VCR. Initially, 70 percent of all titles were labeled pornographic in nature, while today that portion of the market is estimated to be about a fourth to a third.

As the purchase of VCRs spread, mostly among the middle-class, the new owners tended to use the machines for convenience viewing. By far the biggest use of VCRs has been to tape existing television programs for viewing at a later date (time shifting).

The purchase and viewing of prerecorded tapes has had a sporadic history. One problem has been the high cost of taped movies, often running between $60 to $80 a title, combined with a lackadaisical distribution system.

Recently some shifts in marketing strategy have occurred. For selected titles, some of the major movie studios have dropped the selling price to slightly less than forty dollars to test whether or not the increased purchases at the lower price would equal the profits made on the higher-priced tapes. At present, it is still unclear whether or not the price of most prerecorded tapes will drop. This uncertainty reflects, in part, a dramatic recent rise in tape rentals.

Under the first-sale doctrine, the rights for a product or device reside with the first owner of an item, not the seller. If a videotape store buys a movie tape, it can, if it so desires, rent that tape to its customers for whatever price the market will bear. People rent the tape for a number of days; and when they are finished, they return the tape to the store. Again, this is a new phenomenon; and it is difficult to predict how this portion of the VCR market will develop.

Tape sales, in comparison to record sales or television audience size, are rather minimal. However, some titles -- such as some exercise tapes -- can do well, which suggests that the market for tapes is far broader than just movie titles alone. This may be because newer VCR owners are generally young, affluent and interested enough in the mass media to record and time-shift the programs that they wish to view.

Videodisc machines are designed, at present, for people who

really like films. The disc player cannot record and can only play discs for a particular brand of machine. The price of the machine has been dropping lately, mostly to encourage the sale of more machines. The marketing strategy for the machine is essentially like that of the razor, where the profits come from selling the blades, not the razor. The problem for the disc player is that it is not particularly attractive when compared to videocassette recorders -- especially when the price for the two machines is comparable. Most of the major corporations initially interested in discs have withdrawn (e.g., IBM). The number of videodisc machines sold for home use is difficult to estimate, but it is thought to be about 500,000 units.

However, it should be noted that the videodisc machine does have a wide variety of uses in the classroom and in industrial instruction. The disc itself is programmable, and it can hold a sizable amount of information.

What has kept the videodisc in existence has been, to an extent, a phenomenal sale of discs. It is not uncommon for an owner to have 30 titles in his or her library. The price of the discs has been far less expensive than that for prerecorded tapes. Some prices are as low as fifteen dollars, and the mean is somewhere around $20 to $30. The initial buyers of disc machines were decidedly more blue collar than were the owners of VCRs.

In looking ahead, the future for videodisc is clouded by the

question: How big is big? The sale of disc machines is a classic case of a technology driven invention. Given a strong commitment from the principal American manufacturer, RCA, the disc machine will remain. However, compared to the videorecorder, the disc machine has yet to establish itself in the consumer market. Given the commitment, perhaps, the machine may find a place in education and industrial use, and eventually -- in 10 years or so -- move back into the consumer marketplace.

The videotape machine has enough convenience qualities to make it attractive to a segment of the television viewing market. If previous diffusion curves are any indication of predicted growth, the number of machines sold will not increase dramatically; rather, there will be a steady growth in the penetration rate for the machines. By 1990, perhaps 10 percent of all homes will own a recorder of some type.

So it would appear that, while these machines have a niche in the market, they will not be a technology that will significantly reshape media habits in the U.S.

PART VI: MICROCOMPUTERS IN THE HOME

Perhaps no aspect of the new technologies is more volatile than the area of personal or home computers. Since 1978, the time when many experts feel that the explosive growth in microcomputers began, the entire area has been difficult to predict. At this point (mid-1983), the following developments can be summarized.

Background On Microcomputer Development

The field of microcomputers has split into two major market segments. Initially, in the mid-seventies, hobbyists focused on the machines that evolved into Apple-like computers. These machines, often costing more than one thousand dollars, have come to dominate the "high end" of the market. Added to the cost of the Apple genre machines are costly peripherals like floppy-disc drives, printers and expensive programs (or software). The market analysts have labeled these expensive micros, "personal computers". They are far too expensive to be purchased just for games or other entertainment software. So, often these machines function as both household resources and as devices to satisfy certain of the owners' professional needs.

The second major market computer segment arose from the explosive growth of video game machines. The game machines were software specific; that is, they were made for playing video games, and, sometimes, only one brand of games. The industry sought to

sell the machines at a reasonable price and to profit from the sale of game cartridges (i.e, the so-called razor blade marketing theory). In 1982, the market collapsed for game cartridges and, more importantly, for the game machine manufacturers.

This failure was due to the appearance of microcomputers that sold, initially, in the five hundred dollar range and could be used for games and computing as well. Throughout 1982, the market witnessed an extraordinary amount of price cutting for these computers from concerns such as Texas Instruments. The price cuts were so extreme that machines which sold for six hundred dollars in January 1982 were selling for less than two hundred dollars at the end of the year. With computers this cheap, no reason existed to buy a machine that could play games and do nothing else. These cheaper computers were called "home computers" to distinguish them from the more expensive "personal computers."

By mid-1983, the microcomputer market had settled into these two distinct segments: The home and personal computer devices. Also notable during this same period was the entry of IBM into the personal computer market. Its success to date has been quite impressive, controlling, within one year or so, almost 20 to 25 percent of the market with its more expensive machine. And IBM is expected to enter the lower priced end of the market in the near future.

Most observers agree that the number of equipment or hardware

manufacturers is too numerous for the market to support. Many are expected to disappear through mergers, acquisitions or bankruptcy. Perhaps fewer than ten in the microcomputer field will survive the decade. The key to survival is not so much hardware capability as it is the channels of distribution to sell the machines. At present, between 25 to 30 percent of all personal computers are purchased by mail; about 50 to 60 percent are bought from computer stores, and the rest are sold in department and toy stores.

Computers under five or six hundred dollars will have to be mass merchandised through department and discount stores. At a figure above a thousand dollars, machines will, for the present, be sold by computer stores. Such stores can only stock a few brands of machines; and that, in effect, will freeze out many fringe manufacturers. Recently, Texas Instruments has left the lower priced home computer market for the second time, while Osborne, a pioneer builder of portable computers, has declared bankruptcy.

At the same time, manufacturers of large mainframe computers (such as IBM) and makers of minicomputers (e.g., Digital) have moved into the personal computer market. These large, vertically integrated companies will have sufficient resources to garner channels of distribution, or they will create their own.

One of the key ingredients for the success of any microcomputer is its programs, or software. Few manufacturers develop their own software packages; rather, they purchase them from programmers or

program firms. In most instances, major manufacturers like Apple and IBM share their machine specifications with programming firms, which in turn adopt or create programs for these personal computer brands. A major problem for the consumer is that software is not always compatible between machines, since each has its own operating system. A continual problem for manufacturers is that software for their machines often lags two and three years behind the introduction of the computer.

Unless the manufacturer purchases and installs the software in the machine, the consumer confronts the problem of selecting, from available software, those programs he or she wishes to buy. Software is not cheap. It is possible for a consumer to spend as much for software as for the machine. This software cost is in addition to that imposed by the necessary purchase of disk drives to store programs and data. Most owners of the more expensive machines also buy printers and modems (telephone coupling devices which permit communication with other computers). This additional peripheral equipment can sometimes cost more than the computer. (In one instance, a single disk drive for the Commodore 64 costs more than the entire computer.)

The next section of this report will review the major types of computers found in the home. The reader should be cognizant, however, that this review essentially provides a snapshot of the field at one point in time. It is expected that, by the end of the 1980s, microcomputers will be dramatically different from -- to

paraphrase one authority -- "the Tin Lizzies out there now." Machine configurations and software developments are expected, in general, to increase the ease of using the machine (i.e., making them "user friendly"), as well as to multiply the number of functions the computer may perform in the home. However, the changes are expected to be evolutionary, not revolutionary.

The Kinds Of Computers In The Home

As noted above, about four percent of America's 83 million households have a computer. Approximately 70 percent of these households bought a machine within the last 12 months. The brand and model of a computer purchased is important, since it determines the capabilities and, hence, the functions that the machine can perform.

The information that follows is drawn from a special tabulation performed for this review by the Electronic Media Tracking Study (EMTS). A sample of about 500 personal computer owners were interviewed by mail and asked a set of questions about their use of personal computers. In addition, special runs were provided to relate personal computer usage and some other variables associated with the mass media (e.g., viewership of public television).

TABLE VI-1

PERCENTAGE OWNING A MICROCOMPUTER BRAND AND PERCENTAGE PURCHASED IN THE LAST 12 MONTHS

	--------PERCENT--------	
	HOMES OWNING	BOUGHT LAST 12 MONTHS
APPLE	19.3%	57%
ATARI	8.8	81
COMMODORE	12.1	96
IBM	5.6	100
TEXAS INSTRUMENT	9.4	92
TIMEX/SINCLAIR	11.4	87
RADIO SHACK	24.1	57
OTHER BRANDS	12.6	72

Source: EMTS, CPB Special Study, 1983

The EMTS survey was conducted in January 1983, and 71 percent of the respondents had purchased their computers in the last twelve months. The brands with the largest number of owners who purchased a computer in 1981 or before were Apple and Radio Shack, the two major retailers of computers at that time. At present, about 45 percent of the surveyed homes own computers costing less than one thousand dollars.

TABLE VI-2

FACTORS CONSIDERED WHEN PURCHASING A MICROCOMPUTER

	APPLE	ATARI	COMMO-DORE	TEXAS INSTR.	TIMEX	RADIO SHACK	TOTAL SAMPLE
MAKER'S REPUTATION	76%	79%	28%	69%	33%	55%	56%
SERVICE	69	58	18	24	28	72	50
SAME AS KID'S SCHOOL	5	10	0	3	0	2	3
SAME AS WORK	13	3	0	0	0	9	7
BEST VALUE	50	63	80	64	75	50	59
SOFTWARE AVAILABLE	63	38	29	54	28	36	42

Source: EMTS, CPB Special Study, 1983

From Table VI-2 it is clear that for Commodore, Texas Instruments, and Timex, the lower price was a key factor in purchasing the machine. The manufacturer's reputation was a major factor only for Apple and Atari, trailed by a lower percentage for Texas Instruments and Radio Shack. Service was a factor only for the high end machines, Apple and Radio Shack. The kind of computer at one's workplace or at one's child's school had little influence in the determination of what machine to buy. (Too few owners had IBM Personal Computers (PCs) to include them in most portions of the study.)

To overgeneralize, it seems apparent that the more expensive machines were purchased with a different set of evaluative criteria than were the cheaper machines.

TABLE VI-3

DEMOGRAPHICS OF MICROCOMPUTER OWNERS
AND VIEWING PTV ONCE A WEEK OR MORE

	OWN COMPUTER	VIEW PTV
AGE		
UNDER 35	28%	66%
35-54	50	68%
55+	18	72%
EDUCATION		
NO COLLEGE	23%	68%
COLLEGE	72	68%

Source: EMTS, CPB Special Study, 1983

In the above table, the first column (own computer) represents the percentage of the sample who own microcomputers. So, 23 percent of the microcomputer owners have not been to college, 72 percent have attended college. The missing percentage, five percent, represents missing answers. In the second column (viewing public television once a week or more), the percentage indicates penetration. For example, among college educated owners of microcomputers, 68 percent view public television once a week or more.

Education -- specifically, the level of formal education of the head of the household -- is at present the best predictor for ownership of a microcomputer.

Also, income above the $20,000 range tends to be associated with microcomputer ownership. However, households in the higher income ranges (above $30,000) are no more likely to own a microcomputer than are those in the $20,000 to $30,000 range.

Age appears to be related to microcomputer ownership, in that middle-aged and younger folks are more likely to own computers than are those individuals over 55 years old.

In terms of VCRs and video game systems, microcomputer owners are more inclined to own them than is the general population. Forty-six percent of the microcomputer owners have one or more video games, and 23 percent of them own a VCR. In the general population, 24 percent own video games.

Naturally, these computer households are also more likely to subscribe to cable, especially pay cable. So what emerges, up to this point in time, is the fact that a household with a microcomputer is also more likely to have a lot of other high tech machines.

Also included in Table VI-3 is the percentage of each group that viewed public television once a week or more. About two-thirds of each group appears to view once a week or more. So, at some future time, public television might prove to be an effective vehicle for reaching many of these microcomputer owners.

Uses Of Microcomputers

Table VI-4 provides some valuable insights into the reasons people give for buying microcomputers. The first column gives "any reason" for buying the microcomputer (multiple answers were permitted); the second column lists the percentage citing each reason as "a very important factor" in their decision to buy a microcomputer.

TABLE VI-4

REASONS FOR BUYING A MICROCOMPUTER

REASONS FOR BUYING	ANY REASON	VERY IMPORTANT REASON
BUSINESS	57%	60%
LEARN PROGRAMMING	85	60
EDUCATION	50	48
ENTERTAINMENT	74	29
INFO PROCESSING *	24	35
LEARNING/HOW-TO	42	45
WORD PROCESSING	45	55

*Use of modem to obtain information.

Source: EMTS, CPB Special Study, 1983

The popular press has made much of the data provided in the first column in Table VI-4. At first glance it would appear that one of the more popular reasons for buying a computer is for entertainment (including playing games). However, when asked to list a very important reason or application for buying their microcomputer, the percentage of respondents listing entertainment dropped to 29 percent.

The reasons for buying a microcomputer are displayed by brand name in Table VI-5. It is likely that some buyers may have been courting frustration. Some machines -- like the Timex -- appear unable to perform some of the requisite functions adequately. Other machines can do some of these functions, but only with expensive peripherals.

TABLE VI-5

REASONS FOR BUYING MICROCOMPUTERS BY BRAND NAME

(PERCENT CITING VERY IMPORTANT USE)

	APPLE	ATARI	COMMO-DORE	TEXAS INSTR.	TIMEX	RADIO SHACK
BUSINESS	78%	60%	58%	76%	37%	48%
LEARN PROGRAMMING	62	47	74	64	57	59
EDUCATION	47	43	43	69	38	58
ENTERTAINMENT	39	68	16	28	24	18
INFO PROCESSING	43	42	72	14	61	17
WORD PROCESSING	72	0	40	74	68	44

Source: EMTS, CPB Special Study, 1983

Some differentiation appears in the reasons for purchasing various brands. To an extent, each brand's advertising campaign was successful in conditioning consumers' expectations about the machine. Most buyers expected and wanted to learn programming, to use the machines for entertainment (ATARI), or to use them for word processing or business applications (Apple).

TABLE VI-6

PERCENTAGE VERY SATISFIED WITH THEIR COMPUTERS

	PERCENTAGE ENTIRE SAMPLE	VIEW PTV PRIME TIME
APPLE	73%	85%
ATARI	66	57
COMMODORE	61	66
TEXAS INSTRUMENT	72	54
TIMEX	36	8
RADIO SHACK	59	69

Source: EMTS, CPB Special Study, 1983

As Table VI-6 demonstrates, the owners of the lower priced computers are the least satisfied. For the total sample, the exception would be, perhaps, Texas Instruments. Public television's prime time viewers are more satisfied with their Apples and rather satisfied with their Radio Shack and Commodore machines. All other machines tend to be rated lower by PTV viewers in comparison with the total sample.

The table suggests the potential collapse of Timex as a computing device manufacturer. In the case of the other computer brands, satisfaction varied by manufacturer, suggesting that frustration with the machines is a significant factor among many of the owners.

Last, we turn to one of the major puzzles in the microcomputer area -- software. Table VI-7 presents the percentage of respondents who own a type of program and their level of satisfaction. The

puzzle is: The percentage of respondents who claim to have purchased a machine for a certain use (Table VI-4) is much higher than those who claim to own the type of software that would perform that function. For example, 50 percent of the respondents claim that they bought their computers for educational uses; but only 21 percent report owning educational software.

TABLE VI-7

OWNERSHIP AND SATISFACTION
WITH PURCHASED SOFTWARE

	PERCENT OWNING	PERCENT VERY SATISFIED
ENTERTAINMENT	52%	79%
EDUCATION	21	75
DATA MANAGEMENT	10	82
HOME/PERSONAL FINANCE	5	77
COMPUTER LANGUAGE	18	80
WORD PROCESSING	25	82

Source: EMTS, CPB Special Study, 1983

Confusion may arise from how the question was asked in the survey. That is, perhaps software bundled with the machine at the time of purchase was considered "free"; thus, the user needed to purchase no additional programs to perform the functions cited in Table VI-7.

Note that the satisfaction level was high for all of the purchased software.

Problems In Studying Microcomputer Owners

A major problem in studying microcomputer owners is that so few of them exist. This dearth of subjects presents substantial problems in designing and executing scientifically rigorous studies. For example, in the first dissertation on personal computer owners, Dickerson (1982) had to use membership lists of local Apple Owners Clubs to locate enough potential respondents -- hardly a random sample. Her findings, incidentally, were not surprising given the study sample. Early owners of Apples who belonged to clubs were essentially innovators, not early adopters, much like the high tech hobbyists alluded to earlier.

Another problem is that the range of machines and their capabilities further complicate the evidence provided by many current studies, because the owner of a fifty dollar Timex is equated with an owner of the four thousand dollar system. This is somewhat like asking the same set of questions to Moped and Rolls Royce owners.

Little argument appears to exist about the potential instructional and educational uses for microcomputers. With about four to five percent of all households reporting ownership of some kind of computer, it is likely that the microcomputer has emerged from the "innovator" stage and is moving into the early adopter stage.

In any study of microcomputer owners, cost is an important consideration for constructing measurement variables. Owners of the lower priced home computers possess a mixture of motives revolving around buying a machine for learning or computer literacy drills, entertainment (games), and for their children's education (dubbed "computer guilt"). Owners of personal computers (or the higher priced machines) have the same set of motives, plus a few additional ones; e.g., using the machine in their profession or in a hobby.

As the next few years unfold, the lower priced portion of the market is expected to drift toward selling bundled systems for modest costs. The higher priced computers will develop more user friendly operating systems. The line between the higher priced personal computers and the larger minicomputers is expected to blur (cf., Weil, 1982).

Software, especially that oriented toward instruction and educational drills, is expected to increase. Most educational software on the market is now being produced for the higher priced computers, especially the Apple, IBM PC, and Radio Shack models. An extensive software market seems to be missing for the inexpensive computers. (An exception, perhaps, is the Commodore 64.) Still, marketing logic would dictate that the software designed for the more expensive machines is more likely to be purchased because the household should, in general, be better able to afford computer software. Put another way, about half of the owners of microcomputers are in the high end of the market, and these owners

are the apparent target group for most of the educational software on the market.

Finally, a key question appears to be whether microcomputers should be viewed as a technology driven or a consumer driven innovation. The answer would seem to depend upon the vantage point from which one decides to view the computer phenomenon.

The high end of the market appears to be essentially consumer driven. Many physicians, lawyers, accountants, and bankers use a personal computer in their professions. Here, the personal computer purchase is affected primarily by professional interests, not by serendipitous use by other household members. About 18 percent or 14.3 million of all television homes are classified by Nielsen as professional, owner or managerial. A best guess would be that about 2.5 million of these homes have a computer.

Also at the high end of the market, we have units purchased because of a phenomenon dubbed "the encyclopedia syndrome." Parents have been buying encyclopedias for their children's education for generations. This is a discretionary purchase "for the sake of the children." Some of the same motives appear to be driving parents to buy large or expensive computer systems.

However, any number of small and inexpensive computers have apparently also been purchased "because of the children." In Table VI-4, 50 percent of the sample reported buying a computer for

"education." That reason was the highest for Radio Shack. "Is six hundred dollars too much to pay for your child's education?" asked the mother in one of Radio Shack's early commercials. Texas Instruments had a similar commercial campaign featuring Bill Cosby. A recent Commodore advertising campaign has a commercial that stresses computer literacy in which a son flunks out of college because, possibly, he was not computer literate.

The lower end of the market now faces satiation. In the jargon of Madison Avenue, they are "looking for the hot button" -- an advertising campaign that will sell home computers. This suggests the classic approach of a technology driven innovation. The manufacturers are stressing uses and creating needs (among them, guilt) to entice people to buy the machines. If this does not succeed, this whole portion of the market may collapse, and inexpensive computers of this genre may disappear into history, along with the CB radio, the hula hoop and quad-stereo.

A few other services associated with microcomputers will be discussed next in the videotext portion of this review.

Possible New Services For The Home

Two new hybrids, teletext and videotext, are on the media horizon. Both are technology driven devices. Marketing activities in these areas are clearly defensive moves by the corporations that are involved. That is, if these services are going to be

successful, business history suggests that the first company into the industry (e.g., HBO in pay cable) tends to garner the largest share of the market. So a number of companies are experimenting in the fields of videotext and teletext simply because they must protect their corporate flanks. Tydeman, et al. (1982) have provided a convenient summary of this area.

Teletext is a frame of text transmitted to the home via lines in the television signal that are not seen on the projected image. At present, most of the developments in this area are experimental. Teletext is essentially one-way transmission. In order to permit viewing of the text, the TV set requires a decoder. The text is transmitted somewhat like a "drum" of frames, which are captured by the decoder and displayed on the screen. It is possible, in some systems, to key in certain frame numbers so that the decoder will capture those frames for protracted display.

At present considerable problems abound in terms of standards (at least three different, incompatible formats are currently in competition). The limits of the system are imposed by the small number of frames that can be transmitted. The exact format for such text services remains to be determined, as does the answer to the question: "Who pays -- the consumer or the advertiser?"

Currently, the future for such services remains in doubt, since very few serious consumer experiments have been conducted with the service in the United States.

As noted in the cable section of this review, a number of text channels are available to cable subscribers. Most of these services are news and information channels paid for by the cable operator. Some newspapers have experimented with cable versions of teletext ("electronic newspapers"). To date, none of these services is self-supporting, in terms of advertisers paying the total cost of the service. A number of trial experiments have been closed down as unprofitable.

Videotext, as opposed to teletext, employs some form of telephone modem to receive data or text. The modem, in turn, is attached to a television set that functions as a form of display terminal. In most experimental systems to date, the modems have had few, if any, "computer" functions built into them. In most instances, the modem and the TV set function as a "dumb" terminal, with all functions performed by the company's resident computer or computers that service the home or customer.

Using a telephone line means that much more information is available to the customer, and that two-way communication is possible -- mostly in the form of keyed, digital responses (e.g., yes=1 and no=2).

The most ambitious and visible demonstration project with videotext is the joint effort by AT&T and Knight-Ridder, a communications company with a large newspaper chain. The service,

called Viewtron, launched a major marketing effort in late 1983 in south Florida. AT&T has developed a system specific modem that will be priced at $900. Knight-Ridder has spent about $26 million developing the hardware and software for the system.

The service will furnish news and information. In addition, the service will include substantial educational modules developed by CAI experts. The service will also include advertising frames and "want-ads." Some other services are discussed below.

Knight-Ridder entered the videotext field because its new technologies studies in the late 1970's demonstrated that its newspapers could, under some circumstances, be vulnerable to a successful videotext service; that is, the money from its successful newspaper want ad sections could be negatively affected by videotext. So the company entered the field for defensive purposes, the reasoning being that if it had delayed, and if videotext were successful, the company would have had a difficult time reacting and entering the videotext market in time to protect its newspaper investments.

While it is far too early to judge the success or failure of videotext, the marketing stance of the Viewtron experiment is worth reviewing. Market studies concerning consumers' reactions to a matrix of services and pricing strategies were conducted to assist in developing and pricing the current service.

Generally, the studies found that if the cost of the modem was cheap, and if news and information services were priced inexpensively, the potential number of customers would be quite large. However, if the modem was expensive -- priced close to a thousand dollars -- the configurations of services desired by potential customers would change radically, and the number of potential customers would decline sharply. Households prepared to pay a high price for the modem, plus a monthly service charge of $25, differed radically from the "news junkies." The households willing to take the videotext service at the maximum rate wanted transactional services, such as telebanking, teleshopping and business information. While the number of households willing to pay such prices was small in comparison to the news and information fans, the projected payout showed that the smaller number of higher paying "transactional" subscribers would generate income more quickly than would the thousands of low paying "news and information" subscribers.

An interesting aside in these studies was that fans of the electronic transactional services displayed little interest in computers. Those that had computers owned such brands as Commodore or Texas Instruments computers. The fact that a large number of people existed who would use high tech services but who were not interested in owning computers or other gear, came as a surprise to many observers.

Regardless of whether or not any or all of these services come

into existence, the key finding here is that a moderate number of individuals appear interested in services that would allow them to conduct transactions from their homes. These people can afford such services and are little interested in technology per se -- unless it can make their lives a bit easier.

Data Base Services

Interactive, or two-way, computer-managed data bases have been in existence for years. Many businesses, such as brokerage houses, use them regularly. One large system owned by Lockheed (Dialog) has been used by governmental services and libraries for years. When the spurt in microcomputer sales occurred in recent years, a number of new companies were developed to serve the microcomputer owners (Glossbrenner, 1983).

Of particular interest, here, are two companies: the Source and CompuServe. The first is owned by Readers Digest and the second, by H. & R. Block. Both of these companies are positioned toward personal computer use. The microcomputer, via a standard telephone modem, hooks into the company's computer databases. The charges and billing vary by firm; here the type of person who subscribes is of primary interest.

The Source has about 40,000 subscribers; CompuServe has about 70,000. Most of the subscribers are professionals and business people, which means, in most instances, they have high end personal

computers (Apples, Radio Shacks and IBM PCs). Perhaps most of their expenses are tax deductible. It would appear that very few "home owners" join a database service just for access to the world of data and information transactions.

However, one development causes some observers of these services to pause and contemplate. All services have bulletin boards organized around various topics (e.g., Apple user groups, science fiction fans, etc.). These electronic bulletin boards function rather like CB-radio chatter. This sort of parasocial interaction has a number of functions that need not be addressed here, except to note that the first "computer wedding" was generated recently. Two self-described bright, shy residents of New York and Chicago met on a bulletin board, fell in love, and, of course, were married on the Source, via their modems.

The concern here is that such services are functioning as sort of high tech sandboxes for the bright and affluent members of American society. When Viewtron conducted its first field trials, it had a community bulletin board on its system. It became so popular that Viewtron had to close it down because overuse of the bulletin board restricted use (and, hence, testing) of the other portions of the Viewtron services.

Among millions of computer owners, these newer services attract a little over 100,000 customers -- hardly a resounding market at present, considering that the services are not very expensive. The

present conclusion is that few of these services are designed primarily for home use, rather, they are aimed at innovative and affluent professionals who can utilize the services both for pleasure and for business.

PART VII: IMPLEMENTATION OF THE HOME TECHNOLOGY SURVEY

From the previous review of technologies and their potential uses in the home, a number of conclusions or, at least, observations are possible.

Obviously, the sample unit in this review is almost predestined: It is, obviously, the household. For the purpose of this review, we will categorize households into three discrete types: High tech, majority, and underclass households.

"High Tech" Households

It seems clear that about 1.9 million homes can be safely categorized as technology innovators. For a variety of reasons, the residents of these households are among the first to own the machines and services discussed in this review. The residents are affluent, young to middle-aged, and in many instances have children. These households are also more likely to engage in learning projects, to be interested in education, and, in some instances, to be involved in course work at the university level.

These homes traditionally participate in surveys and should be relatively easy to locate and interview, given the proper sampling plan.

The Majority Households

In many instances these majority households -- households that can neither be described as high tech nor underclass -- vary dramatically in composition. Some residents are older, some young, some middle-aged. A sizable number of families is in the group; about two-thirds of all American households would fall into this group, or about 55 million households.

The households represented in this group are typical, or average. Some own a computer, others take cable, and some will be interested in learning projects or course work. The key difference between these households and the high tech households is that the majority household residents acquire innovations slowly and sequentially. Clearly, the amount of disposable income is one factor influencing the diffusion rates for these households. It would seem clear that one of the key variables is attitudinal: These residents are not antagonistic to change or innovation, but they are deliberate and rational in their adoption policies. They buy or adopt technologies when things are firmly established. Innovation for innovation's sake is not particularly appealing to this group. When members of this group begin buying computers or any other machines, the business world may rest assured that the innovation will survive and that the manufacturers will prosper.

When looking for particular kinds of homes in this group, a large number of homes must be surveyed to locate a specific

household type. This is especially true if the innovation is comparatively new (e.g., microcomputer ownership). The importance of majority households is that they function as a valuable baseline measure.

Underclass Households

While just about any label for this group of households is pejorative, the term "underclass" household seems aptly descriptive. A substantial number of homes fall into this category, about 25 percent of American homes. Often, the residents are old. They are always comparatively poor and are usually lacking in college education or other forms of training.

Members of this group are difficult to interview. They are often inarticulate, and it is usually very costly to track them down and to recruit them into samples.

Some Suggestions For Implementing The Survey

Given that many of the phenomena of interest in this survey are "rare" in the population (e.g., microcomputer ownership), a simple random sample is probably the most inefficient study design.

If the question is, "How many people are involved in the phenomena of interest?" then the answer can be gained by use of a simple poll -- such as those performed by Roper or Gallup.

If the questions of interest are aimed at determining who uses a certain device, then subsampling procedures might be enacted. Perhaps even a number of smaller studies might be in order, especially if one wishes to deal in substantive ways with usage patterns (e.g., uses within households that have acquired educational software for the children). The smaller study format would be preferable. Otherwise the questionnaires would get too long, and respondent fatigue would become a critical issue in assessment of the resulting data.

Here, then, is a very brief scenario for a relevant study of issues relating to the use of high tech, in-home innovations for learning projects: First, a set of pretests would be conducted to establish the validity of the instruments. One instrument would deal with learning projects and another with technologies and their usage patterns in the home. Once the instruments have been developed, then a "census" phase would begin. The items could be piggybacked onto omnibus surveys. The "census" phase would not take a single wave approach; rather, a number of waves would be conducted across, say, a period of six months to a year.

Once this phase is completed, one would have a more comprehensive notion of the extent of technology ownership and the number of respondents who may be potential candidates for the studies under consideration. From this analysis, key groups could be identified and studied in depth. Since the relevant individuals

would not be "found" or "quota samples", given the proper conditions population projections from the subsamples could be generated. This, in turn, may permit the drawing of substantive conclusions.

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APPENDIX A

A CANDID REVIEW OF DATA SHORTCOMINGS

The reader is assumed to have a passing knowledge of sampling techniques.

National Probability Samples

A sample size of 1,000 or more is sufficient for most general kinds of surveys that seek to project their findings to a national level. The problem arises if one seeks to analyze subgroups in the sample. For example, the Nielsen national metered sample contains less than 100 nonwhite households. This nonwhite subsample is representative of the nonwhite proportion of the American population, but too small to study by itself.

The conventional solution to this problem is to use a polling service that selects and interviews about ten different national samples a year and to gather, from each wave, those respondents of interest (e.g., microcomputer owners). When 500 or so of them are accumulated, these individuals are re-interviewed about their computer use. If sufficient care is taken to provide adequate geographical and age distributions, then conclusions can be drawn with some certainty of representativeness.

The major problem with this approach is the expense. Minimum costs would be in the $50,000 dollar range.

Industry Data Sources

A major problem with industry statistics concerns the wholesale and distribution networks that are conventionally used for selling. Many industry statistics are based on units that are shipped by the manufacturer, not actual units that are sold to consumers. For example, a manufacturer reports to a trade group that so many million of units have been shipped to wholesalers or secondary distribution centers. That does not mean that the units have been sold to customers, merely shipped.

A specific example would be the problems of Texas Instruments' 99 class microcomputer. The company projected that about 10 million units of that type of computer would be sold in the 1982-1983 season and promptly began to build and ship units. However, the market never developed to that level, and the TI units remained in warehouses.

The time lag between shipping and sale is a major problem for manufacturers when they attempt to project sales. This is not a problem for computer manufacturers alone; but more established industries, such as soap manufacturers, have solved the problem by complicated store-sales measures that keep track of what is actually sold in a probability sample of stores. Commercial survey firms perform these services and issue reports about actual sales levels. Using such data, the manufacturer can learn quickly what is selling and what is not.

For Texas Instruments, the problem was that the units remained warehoused for a number of months and then were returned to them unsold. If, in the meantime, the firm is continuing to manufacture units, the backlog can become awesome. Texas Instruments wrote off 119 million computers in a 90-day period in 1983 and, eventually, withdrew from the home computer market.

The question of how many units have been sold is a problem for microcomputers, videotape recorders, television sets and most consumer durable products that manufacturers normally report in units shipped and dollar value. If the question is, "How many of these units finally end up in the home?", then a problem arises. For example, if all of the microcomputer units reported as sold in the 1980-1982 period were in fact in homes, about 11 to 15 percent of all households should report owning a microcomputer, rather than the four to five percent that is reported in current surveys. The same problems occur in other consumer areas, because some units are sold to businesses, schools, governmental agencies, and some may even be reexported.

The reluctant conclusion is that industry statistics can furnish only rough indications of directions in the consumer field. It is especially difficult in new market areas like microcomputers. Until reputable commercial survey services emerge that monitor actual sales, one is left with crude measures at best.

As suggested in the body of this review paper, the solution demands a combination of approaches. Since the sample unit is

assumed to be the household, the approach, in a sense, reasons back to the question. What polls or services regularly study appropriate national samples of homes? Are they reputable firms? Firms that syndicate data to all parties in a field, such as Nielsen, are preferable to firms that are industry specific and industry supported--mostly trade group firms.

In most areas it is important to separate exaggerations from actual trends. A small firm can sell 50,000 educational software programs and be a bona fide success. Nevertheless, only 50,000 homes have the software -- hardly a national trend. If, however, 50 firms each sell as much software, then perhaps a trend is developing. Again, it is a question of, "How big is big enough?" If it is an issue of "Can company X sell enough software to be a commercial success?", then the economy of scale is much smaller than asking, "Is this phenomenon 'big enough' to commit government funds to nurture and support?" Perhaps the surveys contemplated in this review can answer the first question, but not the last.

APPENDIX B

CABLE SERVICES THAT CARRY ADVERTISING

TABLE B-1

SATELLITE-FED BASIC CABLE SERVICES THAT ACCEPT ADVERTISING

SERVICE	NUMBER OF SYSTEMS	NUMBER OF SUBSCRIBERS	TYPE OF SERVICE
ARTS	1,625	10 MILLION	Cultural programming including music, drama, and dance.
BET	201	4 MILLION	General entertainment and sports programming for the black audience.
CABLE HEALTH NETWORK	1,067	11 MILLION	Programming relating to health and health-related fields. Merged with DAYTIME July, 1983.
CBN	3,892	21 MILLION	Range of religious programming and old network programs.
CABLE NEWS NETWORK	3,409	20 MILLION	A 24-hour news programming service.
CNN HEADLINE	498	4 MILLION	A news headline service including local news elements; companion service to CNN.
DAYTIME	671	9 MILLION	Programming for women.
ESPN	5,928	23 MILLION	A 24-hour sports network featuring live and taped sports events and sports-related programming.
MSN	471	8 MILLION	Educational and consumer-oriented programs; features THE HOME SHOPPING SHOW.
MTV	1,650	14 MILLION	Taped concerts and contemporary video music for teens and young adults.
NASHVILLE NETWORK	725	8 MILLION	Music service with a country music emphasis.
SATELLITE NEWS CHANNEL	557	6 MILLION	A 24-hour news service
SPN	386	6 MILLION	Special-interest programming, special women's feature, how-to programs, some international programming (TELEFRANCE).
SIN	215	25 MILLION	Spanish-language entertainment and news programming
U.S.A.	3,500	18 MILLION	Combination of programming services. Some Madison Square Garden Sports events; CALLIOPE (6:30-7:30 p.m. weeknights and Saturday morning), children's programming; THE ENGLISH CHANNEL, British programming from Granada TV; TOU!; fashion programming and NIGHT FLIGHT, rock music programming.
THE WEATHER CHANNEL	940	9 MILLION	A 24-hour weather service including features and localized reports.
WGN-TV	3,976	11 MILLION	A Chicago-based independent TV station programming a combination of general entertainment, news, and sports; categorized as a superstation and satellite-fed to cable systems by United Video, Tulsa.
WOR-TV	811	5 MILLION	A New York-based independent TV station programming a combination of general entertainment, news, and sports; categorized as a superstation; satellite-fed to cable systems by Eastern Microwave, Syracuse, NY.
WTBS	5,212	26 MILLION	An Atlanta-based independent TV station programming a combination of general entertainment, movies and sports; categorized as a superstation, fed by satellite from Atlanta.

Sources: CABLEFILE/83 and BROADCASTING, May 3, 1982.

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